FLOOD INSURANCE STUDY

HARDIN COUNTY, TENNESSEE

UNINCORPORATED AREAS

REVISED

APRIL 2, 1991

Federal Emergency Management Agency

COMMUNITY NUMBER - 470082

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

TABLE OF CONTENTS

		Page
1.0	INTRODUCTION	1
	1.1 Purpose of Study	1
	1.2 Authority and Acknowledgments	1
	1.3 Coordination	1
2.0	AREA STUDIED	2
	2.1 Scope of Study	2
	2.2 Community Description	2
	2.3 Principal Flood Problems	2
	2.4 Flood Protection Measures	4
3.0	ENGINEERING METHODS	4
	3.1 Hydrologic Analyses	5
	3.2 Hydraulic Analyses	7
4.0	FLOODPLAIN MANAGEMENT APPLICATIONS	9
	4.1 Floodplain Boundaries	9
	4.2 Floodways	10
5.0	INSURANCE APPLICATION	13
6.0	FLOOD INSURANCE RATE MAP	14
7.0	OTHER STUDIES	14
8.0	LOCATION OF DATA	14
9.0	REFERENCES AND BIBLIOGRAPHY	14

TABLE OF CONTENTS (continued)

Page

FIGURES

Figure 1 - Vicinity Map 3

Figure 2 - Floodway Schematic 13

TABLES

Table 1 - Summary of Discharges 7

Table 2 - Floodway Data 11

EXHIBITS

Flood Profiles

Tennessee River Panels 01P-03P
Horse Creek Panels 04P-05P

Flood Insurance Rate Map Index
Flood Insurance Rate Map

Elevation Reference Marks

FLOOD INSURANCE STUDY

HARDIN COUNTY,
UNINCORPORATED AREAS,
TENNESSEE

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study revises and supersedes a previous Flood Insurance Rate Map for Hardin County (Reference 1). This information will be used by the community to update existing floodplain regulations as part of the regular phase of the National Flood Insurance Program. The information will also be used by local and regional planners to further promote sound land use and floodplain development. Minimum floodplain management requirements for participation in the National Flood Insurance Program are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the State (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by the Tennessee Valley Authority (TVA) (the Study Contractor) for the Federal Emergency Management Agency (FEMA), under Inter-Agency Agreement No. EMW-86-E-2223, Project Order No. 2. This study was completed in January 1988.

1.3 Coordination

Streams requiring detailed study were identified at a meeting attended by representatives of the Study Contractor and FEMA in January 1986.

On May 9, 1990, the results of this Flood Insurance Study were reviewed and accepted at a final coordination meeting attended by representatives of the Study Contractor, FEMA, and the community.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the unincorporated areas of Hardin County, Tennessee. The area of study is shown on the Vicinity Map (Figure 1). The incorporated areas within the county were excluded from this study.

Flooding caused by overflow of the Tennessee River and Horse Creek was studied in detail.

Areas having low development potential or minimal flood hazards were previously studied using approximate analyses. The results were shown on the Flood Insurance Rate Map for Hardin County, Tennessee (Reference 1) and are incorporated into this Flood Insurance Study.

The areas studied were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction through January 1993. The scope and methods of study were proposed to and agreed upon by FEMA and Hardin County.

2.2 Community Description

Hardin County is in south central Tennessee. It is bordered on the north by Henderson and Decatur Counties, Tennessee; on the east by Wayne County, Tennessee; on the south by Lauderdale County, Alabama, and Tishomingo and Alcorn Counties, Mississippi; and on the west by McNairy and Chester Counties and the Town of Adamsville, Tennessee. Hardin County is served by U.S. Route 64, and State Routes 15, 57, and 69. The area of the county is 587 square miles. The 1980 population was reported to be 22,280 (Reference 2).

Hardin County has a warm continental climate with hot summers. The highest monthly average summer temperature is 80 degrees Fahrenheit (^{O}F); the lowest monthly average winter temperature is 39^{O}F. The average annual precipitation of 54 inches is reasonably well distributed throughout the year but noticeably less in the late summer and early fall (Reference 3).

2.3 Principal Flood Problems

Flow conditions on the Tennessee River in Hardin County, Tennessee, were altered progressively by construction of a reservoir system from 1936 to 1944 when today's level of regulation was essentially reached. Since 1944, the largest floods, in order of magnitude, were those of March 1973, February 1957, and February 1948. Prior to regulation, the largest floods on the Tennessee River, in order of magnitude, were those of 1897, 1882, 1867, and 1875 (Reference 4).

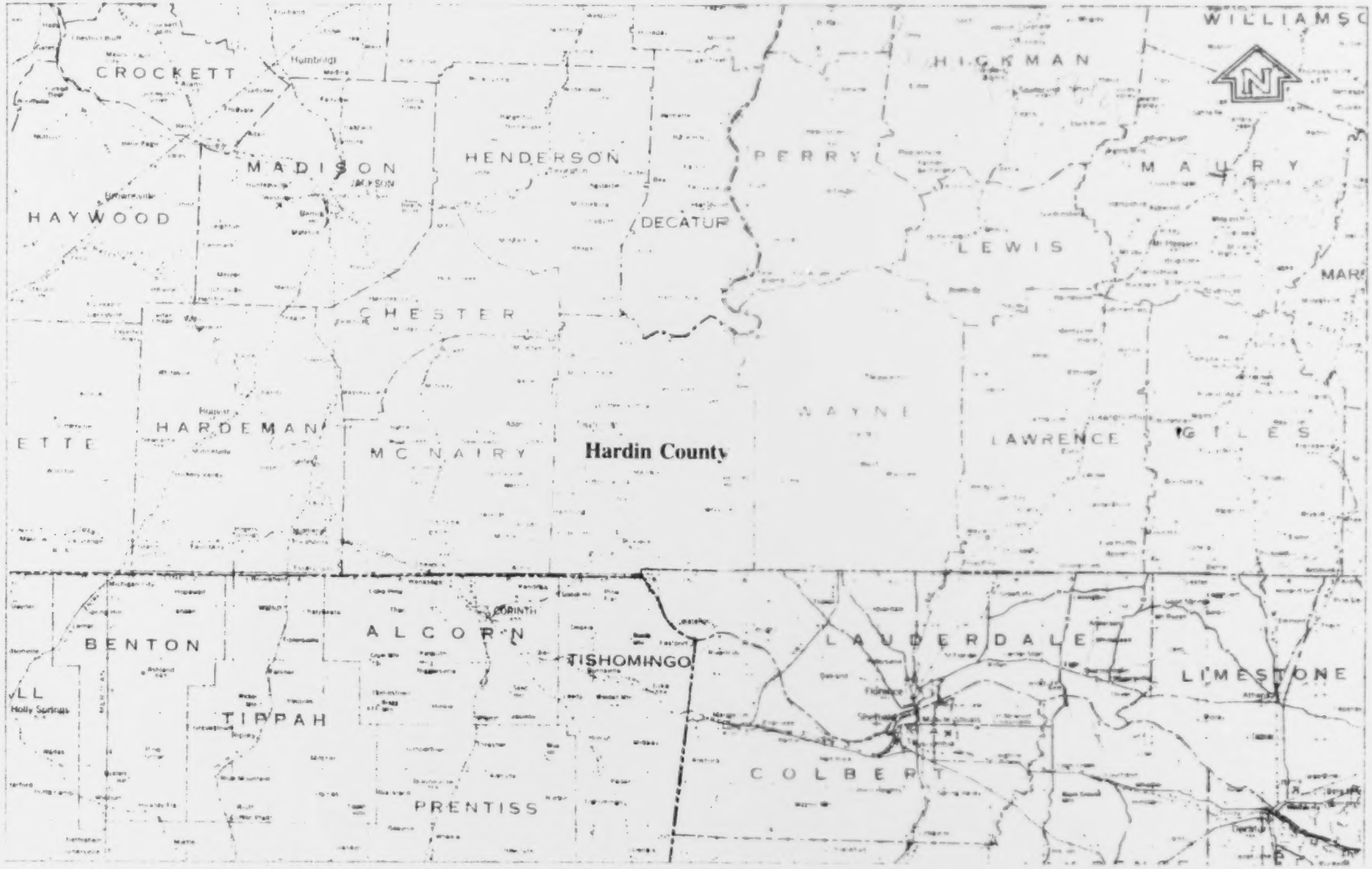

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

HARDIN COUNTY, TN
(UNINCORPORATED AREAS)

APPROXIMATE SCALE
16 0 16 32 48 MILES

3

VICINITY MAP

The flood of March 1973 was the largest post-regulation flood to occur on the Tennessee River. It reached an elevation of 396.1 feet National Geodetic Vertical Datum of 1929 (NGVD) at the Savannah, Tennessee, gaging station on the Tennessee River and had an estimated recurrence interval of about 25 years (Reference 5).

The February 1957 and February 1948 floods reached elevations of 392.4 NGVD and 392.3 NGVD, respectively. These were the second and third largest post-regulation floods, respectively. Both had a recurrence interval of about 10 years. Bottomland around Savannah was flooded to depths of 1 to 14 feet (References 6-9).

The largest unregulated flood known to have occurred on the Tennessee River in Hardin County was the March 1897 flood which reached an approximate elevation of 401.2 feet NGVD at the Savannah gaging station (Reference 4).

Information about past flooding on Horse Creek is available from stream gage records from 1940 to 1986 at the TVA gage (No. 03592800) located near Savannah, Tennessee, and from one local resident who provided general flood information extending back to 1898. The largest recorded flood on Horse Creek occurred on March 15, 1973, and reached an elevation of 419.9 feet NGVD at the gage site and had a discharge of 30,200 cfs and an estimated recurrence interval of 100 years. Some livestock loss was reported and much farmland was flooded (Reference 5). The January 11, 1974 flood, the second highest recorded event at the gage site, reached an elevation of 416.5 NGVD with a discharge of 17,800 cfs and an estimated recurrence interval of 20 years.

According to a long-time resident, large floods occurring on Horse Creek prior to 1940, in order of magnitude, include the events of March 1902, June 1898, and October 1932. Some crop damage was reported from the 1898 and 1932 floods. No other information is available for these floods.

2.4 Flood Protection Measures

Pickwick Dam on the Tennessee River is in Hardin County. This and other upstream projects have substantially reduced the height and frequency of Tennessee River floods.

Nonstructural measures of flood protection, in the form of land-use regulations, are being used to control building within areas that have a high risk of flooding (Reference 10).

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that

is expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedence) in any 50-year period is approximately 40-percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60-percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each riverine flooding source studied in detail affecting the community.

The Tennessee River discharges in Hardin County are regulated by a system of reservoirs including the Kentucky Reservoir, closed in 1944, and Pickwick Reservoir, closed in 1938. Consequently, flood elevations in each reservoir are influenced by both discharge and dam headwater elevations.

Discharge-frequency for the Tennessee River study reach was determined from graphical frequency analysis of the following flow records (References 4, 11, and 12).

LOCATION	RIVER MILE	DRAINAGE AREA (SQ. MILES)	PERIOD OF RECORD	AGENCY
at Kentucky Dam	22.4	40,200	1945-79	TVA
at Savannah, Tennessee	189.9	33,140	1945-79	USGS
at Pickwick Dam	206.7	32,820	1945-78	TVA
at Florence, Alabama	256.7	30,810	1938-79	USGS

Elevation-frequency for Kentucky and Pickwick Reservoirs were determined by backwater computations throughout the entire length of each reservoir using the discharge-frequency determinations

described above. The computed elevation-frequency profiles throughout the reservoirs were adjusted to achieve compatibility and consistency with elevation-frequency curves determined from observed stage records (References 4 and 11-13) at the following locations:

LOCATION	RIVER MILE	DRAINAGE AREA (SQ. MILES)	PERIOD OF RECORD	AGENCY
at Kentucky Dam	22.4	40,200	1945-79	TVA
at Little Eagle Creek, Tennessee	67.0	39,730	1945-66 1970-76	TVA
near New Johnsonville, Tennessee	100.5	38,520	1945-79	TVA
at Britts Landing, Tennessee	121.9	34,780	1945-75	TVA
at Perryville, Tennessee	134.9	34,550	1945-79	USGS
at Clifton, Tennessee	157.4	34,020	1945-66 1970-75	TVA
at Savannah, Tennessee	189.9	33,140	1945-79	USGS
at Pickwick Dam	206.7	32,820	1938-79	TVA
at Smithsonia, Alabama	241.5	31,350	1938-64	USGS
at Florence, Alabama	256.7	30,810	1938-79	USGS
at Wilson Dam	259.4	30,750	1955-79	TVA

Graphical frequency analysis was used for all of the Tennessee River frequency determinations because the standard log-Pearson III analysis (Reference 14) is not applicable to either elevation data or regulated discharge data. The extrapolation of the frequency curves to the 500-year flood was guided by maximum probable flood estimates from maximum probable precipitation determined by the National Weather Service (Reference 15).

For Horse Creek, the TVA gaging station near Savannah, Tennessee, (No. 03593800) was the principal source of data for defining peak discharge-frequency relationships. Upstream and downstream

estimates were made by transfer using a flow-drainage area relationship based on regional flow-frequency relationships. During the study, it was discovered that the upper portion of the stage-discharge rating curve for the Horse Creek stream gage was questionable because it was defined only by two indirect measurements of uncertain accuracy. Hence, the upper end of the rating curve was revised through hydraulic analysis of the stream reach containing the gage site. The lower end of the rating curve is well-defined by a number of actual discharge measurements and was not changed. Annual peak discharges were obtained from this revised rating curve. The adopted peak discharge-frequency estimates are based on the analysis of these annual peak discharges using Bulletin 17B including the skew map of Plate 1 (Reference 14).

Peak discharge-drainage area relationships for the 10-, 50-, 100-, and 500-year floods of each flooding source studied in detail in the community are shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
TENNESSEE RIVER					
at downstream county boundary	34,000	363,300	463,000	498,700	582,300
at Pickwick Dam	32,820	395,000	468,000	500,000	572,000
just downstream of Yellow Creek	32,580	391,000	462,000	499,000	571,000
HORSE CREEK					
at mouth	190	20,000	37,000	46,000	72,000
just downstream of Turkey Creek	180	19,000	36,000	44,000	69,000
just upstream of Turkey Creek	119	14,000	26,000	32,000	51,000
just downstream of Sylvan Heights Road	105	13,000	24,000	30,000	46,000

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Cross sections were field surveyed at bridges and other strategic locations and supplemented with valley sections taken by photogrammetric methods. All bridges and culverts were surveyed to obtain elevation data and structural geometry.

Starting water-surface elevations were depicted using the slope-area method of the HEC-2 step-backwater computer program (Reference 16).

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles and on the Flood Insurance Rate Map.

Roughness coefficients (Manning's "n") used in the hydraulic computations were determined on the basis of field inspections of the channels and floodplain areas and calibrated based on historic flood data. Roughness values for the Tennessee River ranged from 0.03 to 0.033 in the channel and 0.09 to 0.12 in the overbank areas. Values for Horse Creek ranged from 0.035 to 0.05 and from 0.05 to 0.13 in the overbank areas.

The downstream segments of small tributaries, near their confluences with large rivers or reservoirs, are generally subject to two types of flooding: flooding from the headwaters of the tributary itself and backwater flooding from the river or reservoir. The flood profiles for those tributary segments should therefore be based on the combined probabilities of both types of flooding. For the flood profiles for tributaries in this study, the probability of flooding above a certain elevation on the tributary was calculated as the sum of that probability and the probability of the same elevation being exceeded on the river or reservoir, minus the product of those probabilities. This combined probability method is based on the assumption that the flood events on the tributary and the river or reservoir are independent but not mutually exclusive.

Independence is assumed because flooding on a large river or reservoir usually results from a storm that is centered outside the tributary drainage area and that generally does not produce significant flooding on the tributary. Similarly, flooding on the tributary usually results from a storm that is centered over the tributary drainage area and that does not generally produce significant flooding on the large river or reservoir. However, floods, not necessarily of the same frequency, can occur on both the tributary and the large river or reservoir as the result of the same storm; therefore, the flood events are not mutually exclusive.

The method described produces profiles that are higher than flat profiles representing backwater from the large river or reservoir and lower than those that would result from an analysis in which concurrent floods of equal frequency are assumed to occur on both sources of flooding.

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals. In cases where the 50- and 100-year flood elevations are close

together, due to limitations of the profile scale, only the 100-year profile has been shown.

The hydraulic analyses for this study are based on the effects of unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the NGVD. Elevation reference marks used in this study are shown on the map and described in the exhibit labeled Elevation Reference Marks.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the 100-year and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at scales of 1:4800 with contour interval of 4 feet and 1:24000 with a contour interval of 20 feet (References 17 and 18).

The 100- and 500-year floodplain boundaries are shown on the Flood Insurance Rate Map. On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, AE, AH, AO, A99, V, and VE), and the 500-year floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 100- and 500-year floodplain boundaries are close together, only the 100-year floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the 100-year floodplain boundary was delineated using the Flood Insurance Rate Map for Hardin County (Reference 1).

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces the flood-carrying capacity, increases the flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways for this study were designed for optimum benefit to the community. Floodway analyses were based on equal conveyance reduction and adjusted as necessary to account for the effects of existing development and to provide functional and manageable floodways. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections and are shown in Table 2, Floodway Data. The computed floodways are shown on the Flood Insurance Rate Map. In cases where the floodway and 100-year floodplain boundaries are either close together or collinear, only the floodway boundary is shown. Portions of the floodway for the Tennessee River lie outside the county boundary.

Along streams where floodways have not been computed, the community must ensure that the cumulative effect of development in the floodplain will not cause more than 1.0-foot increase in the base flood elevations at any point within the community.

The area between the floodway and the 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
TENNESSEE RIVER								
A	160.30	3800[2]	121,233	4.1	391.6	391.6	392.5	0.9
B	162.70	3000[2]	108,138	4.6	392.5	392.5	393.4	0.9
C	164.80	4940[2]	147,362	3.4	393.4	393.4	394.4	1.0
D	166.89	3150[2]	109,089	4.6	394.0	394.0	395.0	1.0
E	168.35	3300[2]	118,829	4.2	394.7	394.7	395.7	1.0
F	171.06	4050[2]	137,795	3.6	395.6	395.6	396.6	1.0
G	173.18	6250	167,186	3.0	396.5	396.5	397.3	0.8
H	175.27	5530	194,594	2.6	397.1	397.1	398.1	1.0
I	177.37	3350	91,829	5.4	397.4	397.4	398.4	1.0
J	179.94	7100	236,789	2.1	399.0	399.0	399.9	0.9
K	181.56	6400	225,723	2.2	399.2	399.2	400.2	1.0
L	184.08	13,440	313,382	1.6	399.6	399.6	400.5	0.9
M	185.25	15,830	389,188	1.3	399.8	399.8	400.7	0.9
N	187.84	14,500	400,554	1.2	400.1	400.1	401.0	0.9
O	189.94	13,005[3]	349,852	1.4	400.8	400.8	401.7	0.9
P	191.97	15,467	423,950	1.2	401.1	401.1	402.0	0.9
Q	193.73	15,740	445,659	1.1	401.2	401.2	402.1	0.9
R	195.38	15,000	435,467	1.1	401.4	401.4	402.3	0.9
S	198.02	13,100	361,026	1.4	401.7	401.7	402.6	0.9
T	200.42	12,480	261,471	1.9	402.1	402.1	403.0	0.9
U	202.33	10,620	294,331	1.7	402.6	402.6	403.6	1.0
V	204.03	9880	236,928	2.1	403.0	403.0	404.0	1.0
W	205.47	8555	215,740	2.3	403.4	403.4	404.4	1.0
X	206.70	6300	258,821	1.9	419.7	419.7	419.7	0.0
Y	208.16	5200	174,048	2.9	419.7	419.7	419.7	0.0
Z	209.15	4500	169,400	2.9	419.8	419.8	419.8	0.0

[1]MILES ABOVE MOUTH
[2]THIS WIDTH EXTENDS BEYOND COUNTY BOUNDARY
[3]THIS WIDTH EXTENDS WITHIN AREA NOT INCLUDED

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

HARDIN CO., TN
(UNINCORPORATED AREAS)

FLOODWAY DATA

TENNESSEE RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
TENNESSEE RIVER								
AA	210.20	5350	200,093	2.5	419.9	419.9	419.9	0.0
AB	211.22	7530	300,672	1.7	420.0	420.0	420.0	0.0
AC	213.23	7800	259,559	1.9	420.0	420.0	420.0	0.0
AD	214.23	7950	226,278	2.2	420.1	420.1	420.1	0.0
HORSE CREEK								
A	15,020[2]	1090	13,997	3.2	399.3	374.2[4]	375.2	1.0
B	28,515[2]	990	5202	8.5	399.3	385.1[4]	385.9	0.8
C	30,920[2]	1420	18,749	2.4	399.4	388.3[4]	388.8	0.5
D	39,880[2]	1760	15,631	2.0	399.4	390.7[4]	391.5	0.8
E	42,195[2]	2240	4783	6.7	399.6	394.4[4]	394.8	0.4
F	48,335[2]	300[3]	4081	7.8	401.1	399.5[4]	400.0	0.5
G	56,800[2]	1050	9018	3.5	405.2	404.9[4]	405.8	0.9
H	63,660[2]	1720	12,986	2.4	409.6	409.6	410.5	0.9
I	67,130[2]	450	4562	6.7	413.3	413.3	414.1	0.8
J	69,860[2]	340	5636	5.3	417.7	417.7	418.7	1.0
K	73,180[2]	760	8468	3.5	421.3	421.3	422.2	0.9
L	77,290[2]	1410	14,315	2.1	424.5	424.5	425.4	0.9
M	83,200[2]	1120	8622	3.4	428.6	428.6	429.5	0.9
N	90,920[2]	580	7453	3.9	438.2	438.2	439.0	0.8

[1]MILES ABOVE MOUTH
[2]FEET ABOVE CONFLUENCE WITH TENNESSEE RIVER
[3]THIS WIDTH EXTENDS WITHIN AREA NOT INCLUDED
[4]ELEVATIONS WITHOUT CONSIDERING EFFECTIVE JOINT PROBABILITY DETERMINATION

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

HARDIN COUNTY, TN
(UNINCORPORATED AREAS

FLOODWAY DATA

TENNESSEE RIVER–HORSE CREEK

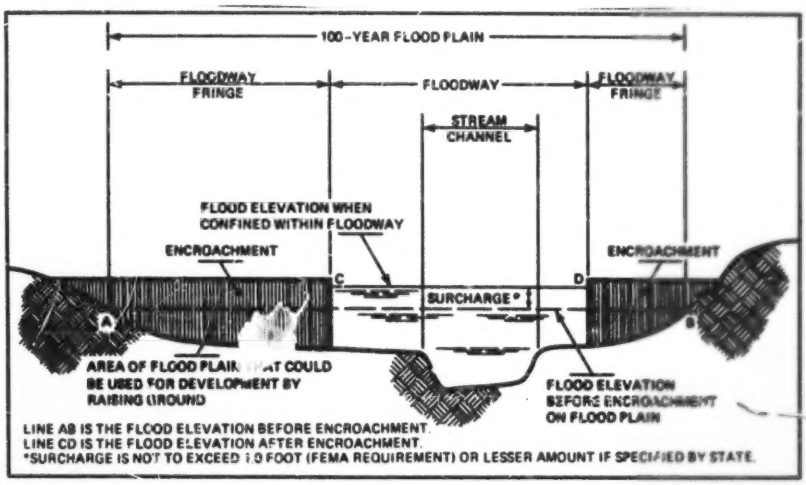
100-YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE AB IS THE FLOOD ELEVATION BEFORE ENCROACHMENT.
LINE CD IS THE FLOOD ELEVATION AFTER ENCROACHMENT.
*SURCHARGE IS NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

FIGURE 2 - Floodway Schematic

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 100-year floodplain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols the 100- and 500-year floodplains, the floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

7.0 OTHER STUDIES

The Flood Insurance Studies published for Henderson and McNairy Counties, Tennessee, Alcorn County, Mississippi, and Lauderdale County, Alabama (References 19-22) agree with this study.

Flood Insurance Rate Maps printed for the Town of Adamsville, the City of Savannah, and Decatur County, Tennessee (References 23-25) agree with this study.

This Flood Insurance Study supersedes the previously printed Flood Insurance Rate Map for Hardin County (Reference 1).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, 1371 Peachtree Street, NE., Suite 736, Atlanta, Georgia 30309.

Future revisions may be made that do not result in the republishing of the Flood Insurance Study report. To ensure that any user is aware of all revisions, it is advisable to contact the map repository of flood hazard data located in the community.

9.0 REFERENCES AND BIBLIOGRAPHY

1. Federal Emergency Management Agency, Flood Insurance Rate Map, Hardin County, Unincorporated Areas, Tennessee, September 1986.

2. U.S. Department of Commerce, Bureau of the Census, 1980 Census of Population, Number of Inhabitants, Tennessee, Washington, D.C., January 1982.

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5. ----------, Division of Water Control Planning, Report No. 0-7129, Floods of March 1973 in the Tennessee River Basin, Knoxville, Tennessee, June 1974.

6. U.S. Geological Survey, Water-Supply Paper 1506, Surface Water Supply of the United States 1957, 1959.

7. ----------, Water-Supply Paper 1113, Surface Water Supply of the United States 1948, 1951.

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11. ----------, Division of Water Management, River Management Branch, Annual Reports, Operation of TVA Reservoirs, 1945-79.

12. U.S. Geological Survey, Annual Water Supply Paper Reports, Water Resources Data for Tennessee, Water Years 1945-1979.

13. National Oceanic and Atmospheric Administration, National Weather Service, Daily River Stages, Annual Reports, 1945-79.

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15. U.S. Department of Commerce, National Weather Service, Technical Paper No. 40, Rainfall Frequency Atlas of the United States, Washington, D.C., May 1961.

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17. Tennessee Valley Authority, Mapping Services Branch, Unpublished Topographic Maps, Scale 1:4800, Contour Interval 4 Feet: Chattanooga, Tennessee, 1984.

18. U.S. Geological Survey, 7.5 Minute Series Topographic Map, Scale 1:24000, Contour Interval 20 Feet: Hookers Bend, Tennessee, 1949, photorevised 1972; Sardis, Tennessee, 1949, photorevised 1972; Thurman, Tennessee, 1949, photorevised 1972; Bath Springs, Tennessee, 1949, photorevised 1972; Milledgeville, Tennessee, 1949, photorevised 1972; Olivehill, Tennessee, 1949, photorevised 1972; Statonville, Tennessee, 1949, photorevised 1972; Pittsburg Landing, Tennessee, 1972; Savannah, Tennessee, 1972; Wolf Pit Ridge, Tennessee, 1949, photorevised 1972; Mitchie, Tennessee, 1949, photorevised 1972; Counce, Tennessee, 1949, photorevised 1972; Pickwick, Tennessee-Alabama, 1949, photorevised 1972; Lowryville, Tennessee-Alabama, 1949, photorevised 1972; Kendrick, Mississippi-Tennessee, 1950, photorevised 1969; Doskie, Mississippi-Tennessee, 1950, photorevised 1969; Yellow Creek, Mississippi-Alabama-Tennessee, 1953, photorevised 1969.

19. Federal Emergency Management Agency, Flood Insurance Study, Henderson County, Unincorporated Areas, Tennessee, September 1988.

20. ----------, Flood Insurance Study, McNairy County, Unincorporated Areas, Tennessee, April 1991.

21. ----------, Flood Insurance Study, Alcorn County, Unincorporated Areas, Mississippi, January 1991.

22. ----------, Flood Insurance Study, Lauderdale County, Unincorporated Areas, Alabama, March 1991.

23. ----------, Flood Insurance Rate Map, Town of Adamsville, McNairy County, Tennessee, September 1986.

24. ----------, Flood Insurance Rate Map, City of Savannah, Hardin County, Tennessee, July 1986.

25. ----------, Flood Insurance Rate Map, Decatur County, Unincorporated Areas, Tennessee, September 1987.

ELEVATION REFERENCE MARKS

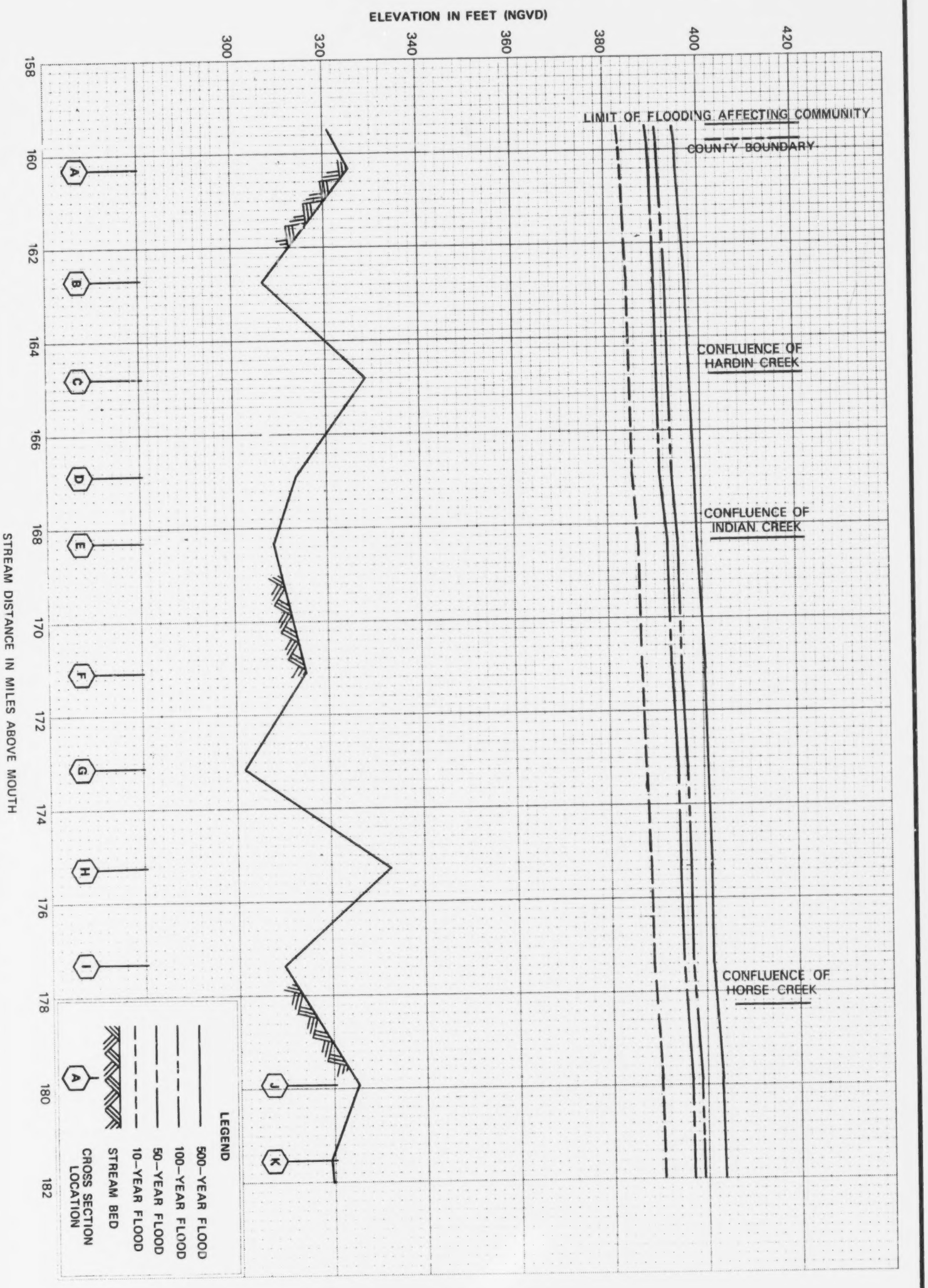
REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
1	0050	440.0	Tennessee Valley Authority tablet stamped "RT GN 10 1935" set in concrete monument located on an unnamed road about 900 feet west of bridge over Dowdy Branch
2	0050	371.7	Tennessee Valley Authority tablet stamped "RT GN 7 1935" set in concrete monument located 25 feet south of centerline of unnamed road, about 600 feet west of Tanyard Branch
3	0025	371.2	Tennessee Valley Authority tablet stamped "LK 262 1944" set in headwall of box culvert for Wilkinson Pond Slough under unnamed road, about 4,600 feet west of intersection with State Route 128
4	0075	371.8	U.S. Coast & Geodetic Survey bronze disk stamped "B 35 1934 371.764" set in top of concrete post located on bank at end of a row of hedge trees, 25 feet northeast of centerline of unnamed road, about 1.5 miles south of intersection with county road
5	0075	394.9	chiseled square set on top of upstream concrete abutment of State Route 128 bridge over Horse Creek
6	0075	405.9	top of brass pipe in center of chiseled square on top of right upstream concrete curb of Wayne Road bridge over Horse Creek
7	0075	404.1	chiseled square on top of concrete abutment of Wayne Road bridge over Horse Creek tributary 2,000 feet east of Horse Creek
8	0075	429.3	Tennessee Valley Authority tablet stamped "RT GN 52 1935" set in concrete monument located about 200 feet north of intersection of two unnamed roads

ELEVATION REFERENCE MARKS (Continued)

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
9	0075	422.8	Tennessee Valley Authority tablet stamped "RT GN 50 1935" set in concrete monument located 30 feet south of intersection of two unnamed roads
10	0075	385.9	Tennessee Valley Authority tablet set in concrete monument stamped "RT GN 30 1935" located on eastern bank of the Tennessee River, 0.8 mile upstream from Cravens Landing
11	0075	410.7	chiseled square on left upstream wingwall of Pinhook Road bridge over Horse Creek
12	0125	385.4	Tennessee Valley Authority tablet stamped "RT GN 119 1935" located along Landing Road about 1.1 miles north of intersection with Williams Road
13	0125	381.5	Tennessee Valley Authority tablet stamped "K 171 1947" set in top of headwall of culvert for Snake Creek under State Route 22
14	0125	388.0	Tennessee Valley Authority tablet stamped "RT GN 152 1935" set in concrete monument located 25 feet southwest of Pittsburg Landing Road, 1.1 miles northwest of bridge over Todd Slough
15	0125	393.7	Tennessee Valley Authority tablet stamped "LHT 706 1938" set in top of concrete post located 600 feet northeast of Fraley Road bridge over Lick Creek, 75 feet northwest of road intersection
16	0125	422.2	Tennessee Highway Department bronze cap set in upstream concrete curb of Sylvan Heights Road bridge over Horse Creek, 1.0 foot from left end of bridge

ELEVATION REFERENCE MARKS (Continued)

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
17	0125	421.6	nail in eastern upstream abutment of unnamed road bridge over Horse Creek
18	0125	458.3	standard Tennessee Highway Department disk stamped "69 14 1962" and cemented in a drilled hole in top of upstream headwall of culvert for Robertson Branch under Florence Road
19	0175	389.4	Tennessee Valley Authority tablet stamped "RT GN 161 1935" set in concrete monument located along eastern bank of the Tennessee River, 1.8 miles downstream of Pickwick Dam
20	0175	476.6	Tennessee Valley Authority tablet stamped "PSR 3 L" set in concrete post located along western bank of the Tennessee River at Winn Springs, 7.6 miles upstream of Pickwick Dam
21	0175	433.21	Tennessee Valley Authority tablet stamped "RT GN 145 1935" set in concrete monument located on eastern bank of the Tennessee River, 3.2 miles upstream of Pickwick Dam, 140 feet east of Old Savannah-Waterloo Highway centerline
22	0175	425.8	standard Tennessee Valley Authority tablet stamped "PSR 2 L" set in concrete post 208.2 located on western bank, south of the Tennessee River 1.5 miles upstream of Pickwick Dam on wooded hillside, 190 feet west of fence on west edge of field, 18 feet southeast of 16-inch poplar tree



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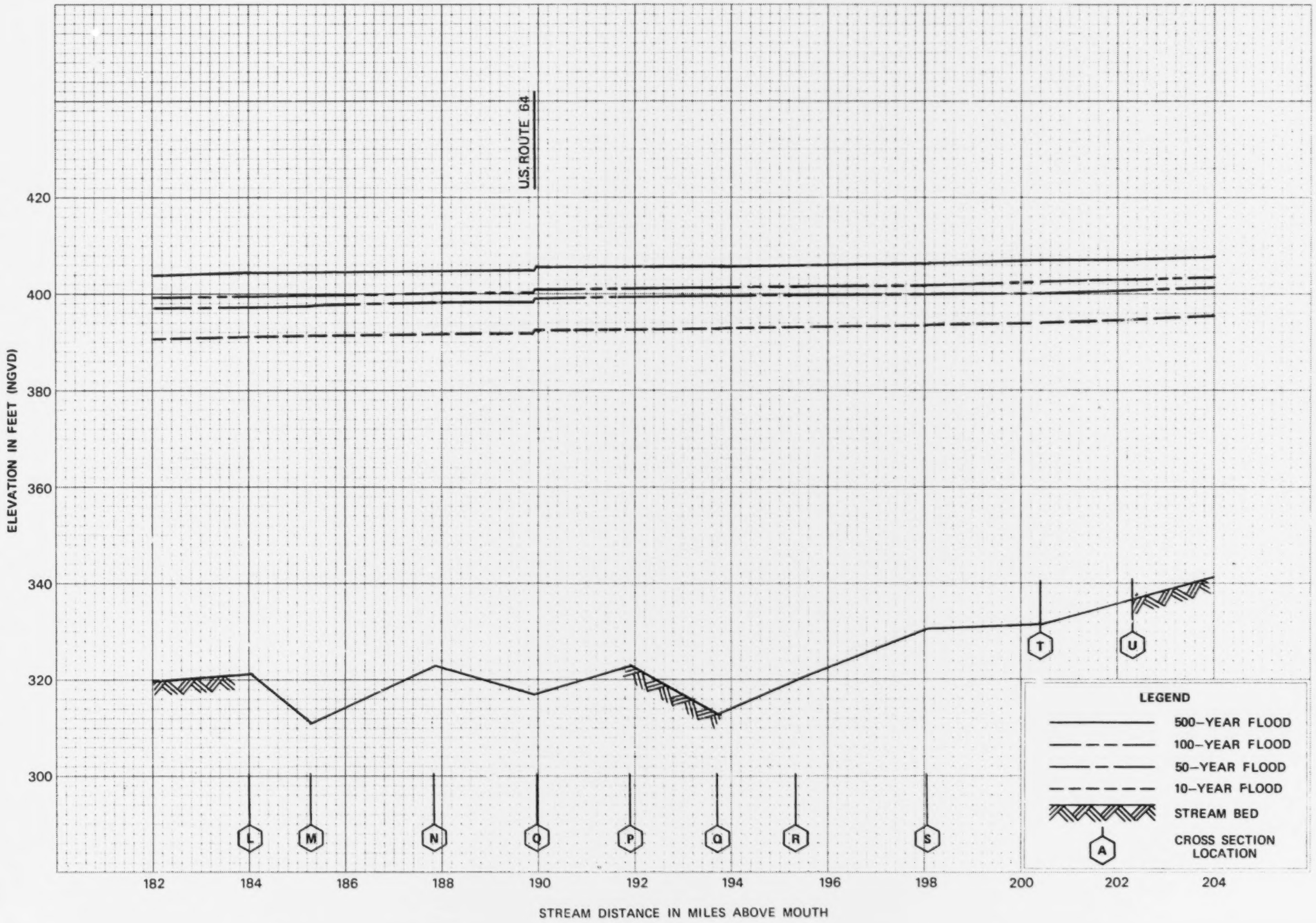


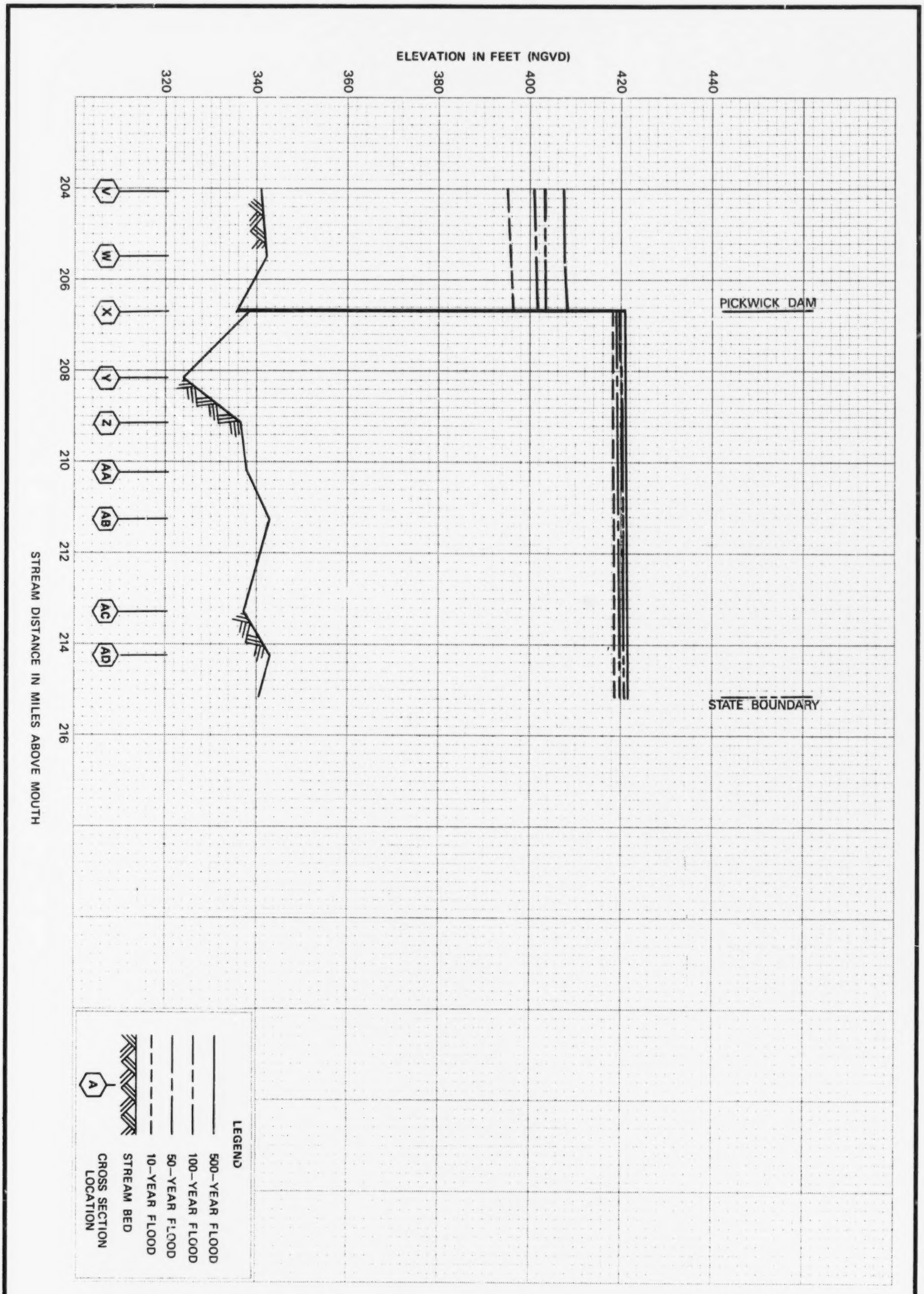
FLOOD PROFILES

TENNESSEE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

HARDIN COUNTY, TN
(UNINCORPORATED AREAS)

02P



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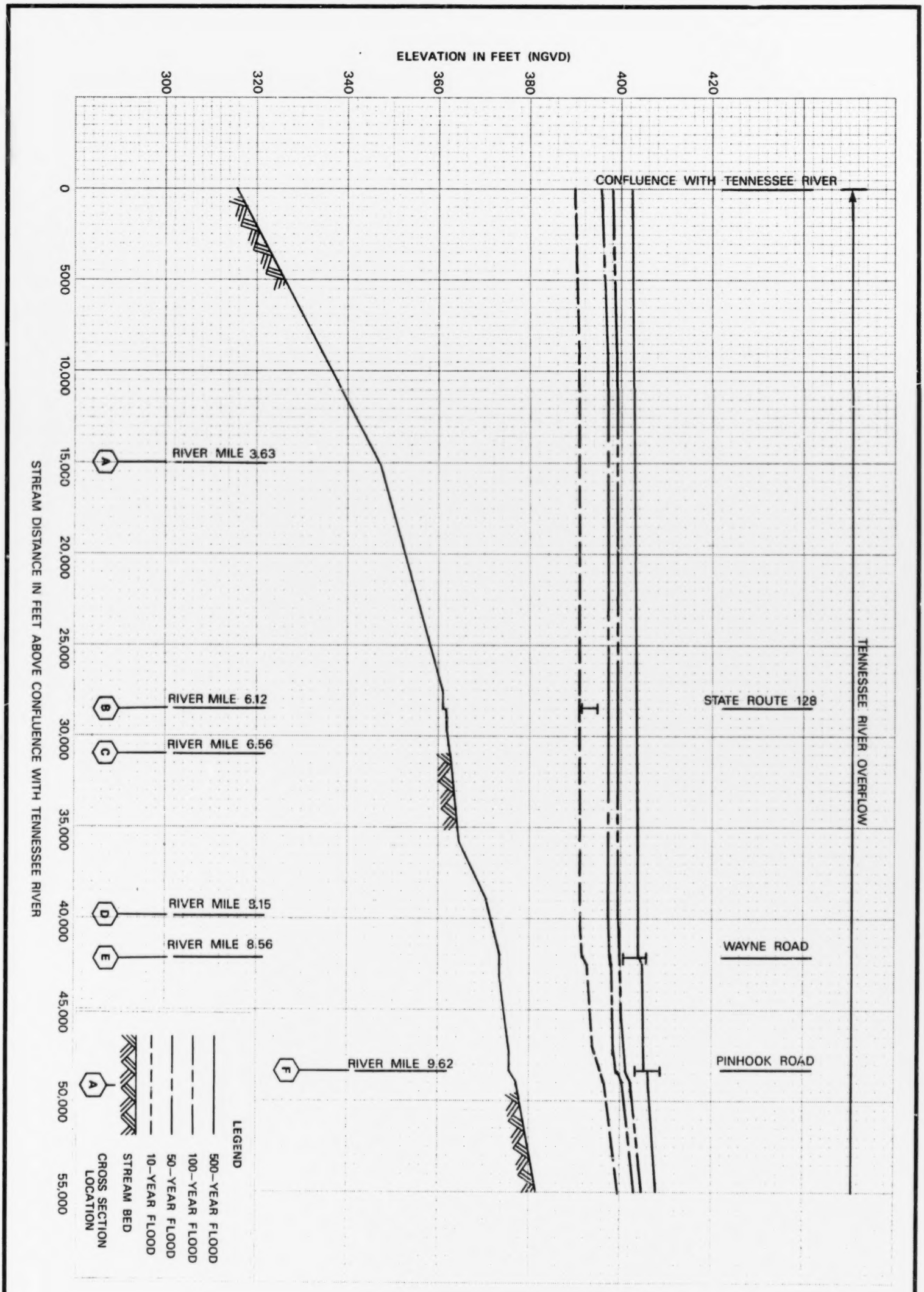
FEDERAL EMERGENCY MANAGEMENT AGENCY

HARDIN COUNTY, TN
(UNINCORPORATED AREAS)

FLOOD PROFILES

TENNESSEE RIVER



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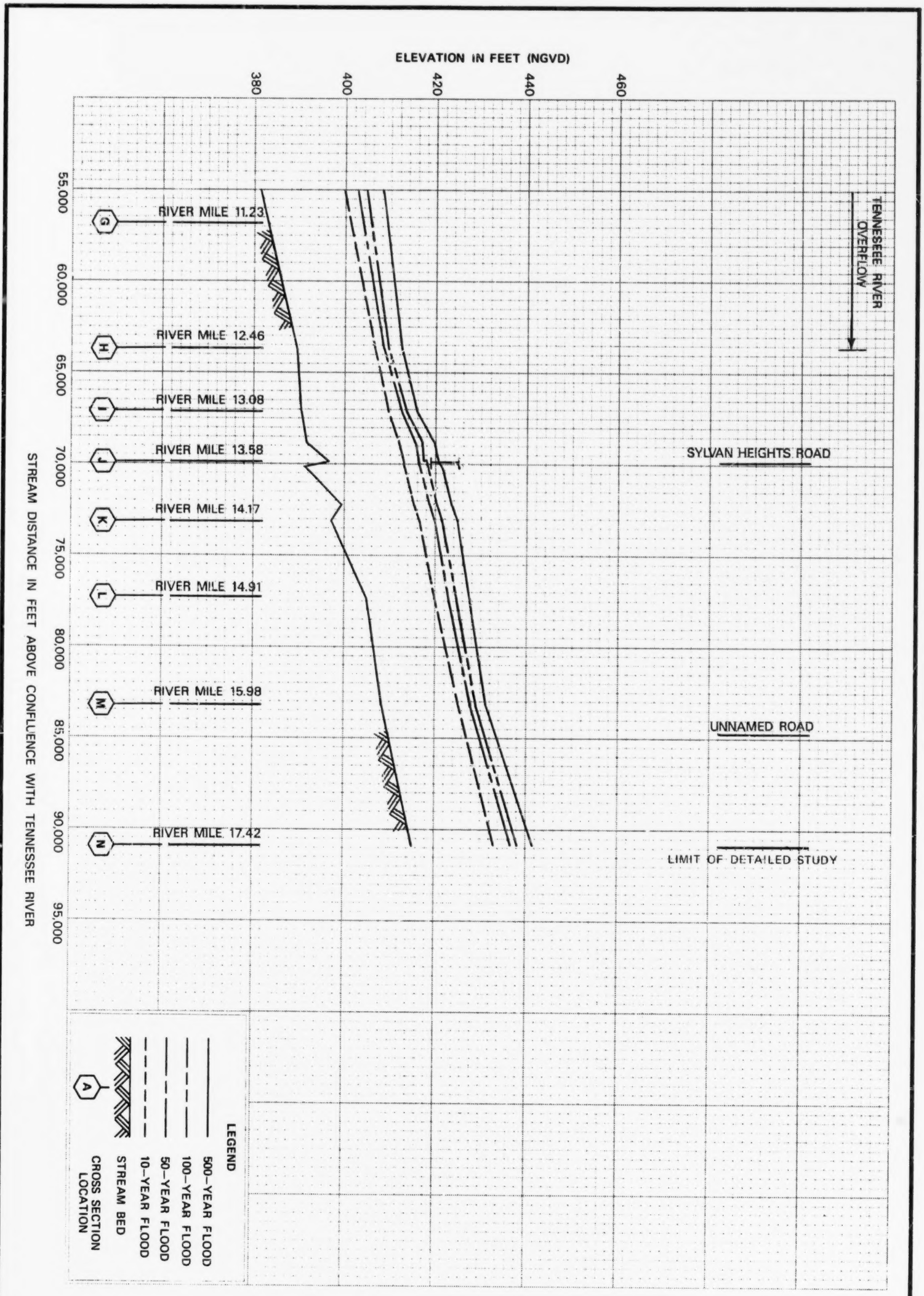
04P

FEDERAL EMERGENCY MANAGEMENT AGENCY

HARDIN COUNTY, TN
(UNINCORPORATED AREAS)

FLOOD PROFILES

HORSE CREEK



FEDERAL EMERGENCY MANAGEMENT AGENCY

HARDIN COUNTY, TN
(UNINCORPORATED AREAS)

FLOOD PROFILES

HORSE CREEK

05P